植物研究雑誌
J. Jpn. Bot.
79: 235–240 (2004)

A New Species of *Saussurea* (Asteraceae) from Honshu, Japan

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(Received on March 6, 2004)

A new species of *Saussurea* (Asteraceae), *S. wakasugiana*, is described from the Wakasa Area, Fukui Prefecture, central Japan. *Saussurea wakasugiana* is morphologically similar to *S. kudoana* Tatew. & Kitam. and *S. insularis* Kitam.: *S. kudoana* is distinguished from the new species by having narrowly ovate and serrulate leaves with acuminate apices and with roundish to subtruncate or shallowly cordate bases and longer dark brownish achenes; *S. insularis* is discriminated from it by having ovate, coarsely serrate leaves with acuminate apex and the presence of minute scaly bracts on peduncles. This new species occurs on rocky slopes with ultrabasic gravel on the seashore.

Key words: Fukui Prefecture, new species, *Saussurea wakasugiana*, the Wakasa Area, ultrabasic rocks.

In October of 2002 Mr. Takao Wakasugi, the Director of Fukui Botanical Garden, showed me some *Saussurea* plants (Asteraceae). The plants were found and collected by him from the Ôshima Peninsula, the Wakasa Area, Fukui Prefecture, central Honshu, western Japan, and transplanted to the Botanical Garden. The plants are characterized by having coriaceous leaves, heads arranged in a compact corymb and narrowly cylindrical involucres with short ovate outer phyllaries. At first sight the *Saussurea* plants resemble *S. insularis* Kitam. described from Mt. Shiratake, Island Tsushima, Nagasaki Prefecture, Kyushu, western Japan because they share the coriaceous leaves, similarly arranged heads and the ovate shorter outer phyllaries than the inner ones in common. However, the plants at issue are different from *S. insularis* in having thicker and dully lustrous leaves and lack of minute scaly leaves on the peduncles. Since the plants from the Ôshima Peninsula were through with the flowering at the time of study, comparison of floral organs between the two entities was not done.

In September of 2003 field work was carried out in Ôshima Peninsula, Fukui Prefecture under the guidance of Mr. T. Wakasugi. The *Saussurea* plants were found growing along the contact line between rocky steep mountain slopes and the sea shore (Fig. 1A). They occurred as small sporadic populations (Fig. 1B). The habitat was covered with dark grayish green gravels and pebbles (Fig. 1A). The gravels and pebbles are derived from peridotite constituting the strata of the Ôshima Peninsula (Ishiwatari 1985). The plants were not detected in sites lacking such a substrate. The plants in concern seem to prefer ultrabasic soils.

Saussurea kudoana Tatew. & Kitam. (including var. *uryuensis* Kadota; Kadota 1987) distributed in Hokkaido, northern Japan, is

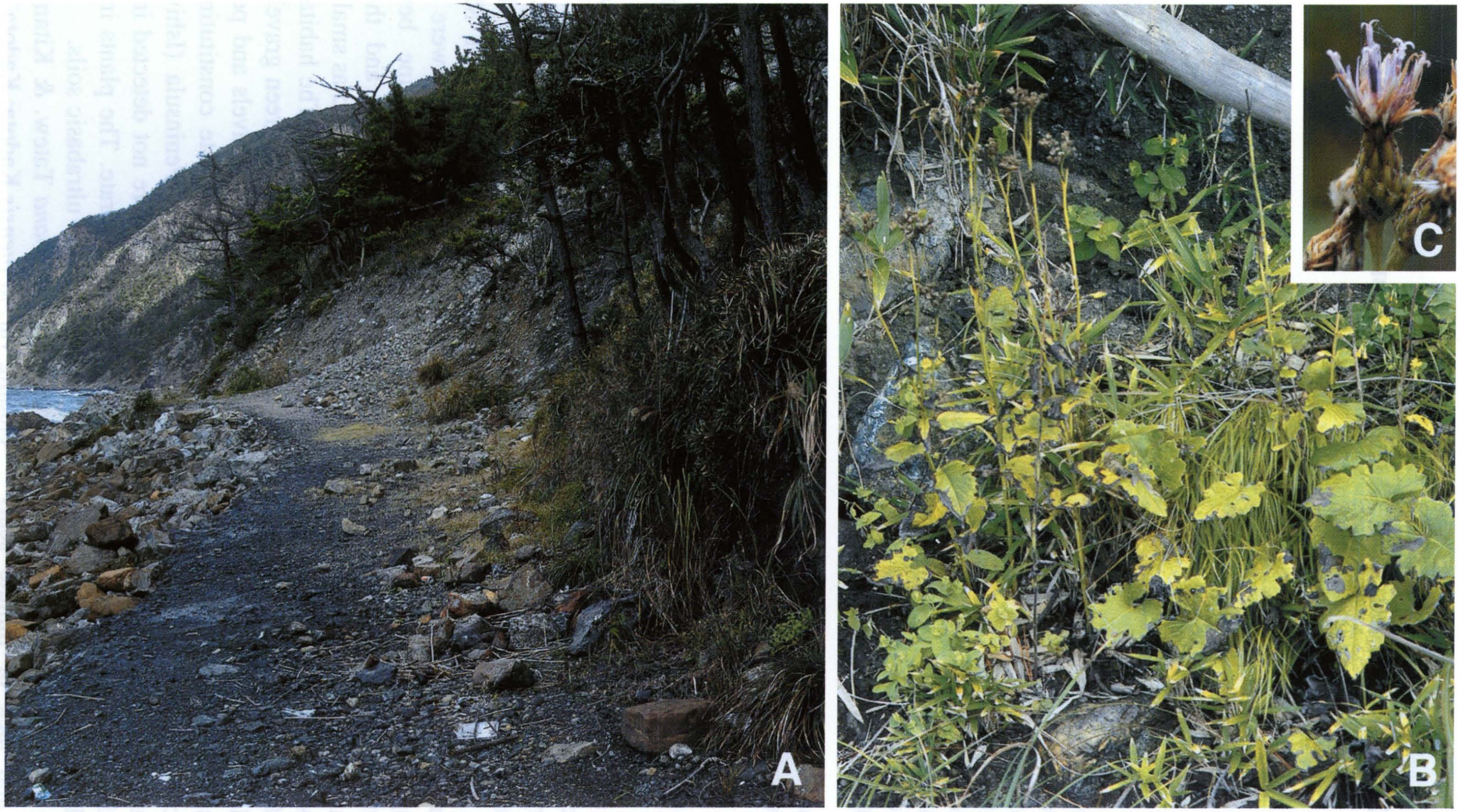


Fig. 1. Habitat and habit of *Saussurea wakasugiana* Kadota. A. Habitat (the Shaka-ga-hama Beach, Ôi-cho, Ôi-gun, Fukui Pref., Honshu, Japan). Pebbles on the beach appear dark greyish green because they are made from olivines (an ultrabasic rock). B. Habit. C. Capitula.

known as a representative of serpentinophytes. *Saussurea kudoana* is similar to the *Saussurea* from the Ôshima Peninsula in having dully lustrous coriaceous leaves and narrowly tubular involucres. However, *S. kudoana* is significantly different from the *Saussurea* plants in question as it possesses narrowly ovate leaves with roundish to subtruncate or shallowly cordate base and larger (ca. 6 mm long), dark brownish achenes. It is consequently concluded that the *Saussurea* plants at issue belong to an undescribed species. This species is described here as a new species of *Saussurea*, *S. wakasugiana*, after the name of the first discoverer of the new species.

Genus **Saussurea** DC. in Ann. Mus. Paris **16**: 156, 198 (1810) & **6**: 531 (1838).

Subgenus **Saussurea**

Sect. **Saussurea**: Lipsch., Genus *Saussurea* 215 (1979) – H. Koyama in K. Iwats. & al., Fl. Jap. **IIIa**: 153 (1995) – Chen Y.-L. & Shih in Shih & Jin S.-Y., Fl. Reipub. Pop. Sin. **78**(2): 158 (1999).

Sect. *Lagurostemon* auct. non (Cass.) DC.: Nakai in Bot. Mag. Tokyo **29**: 195 (1915) – Kitam. in Acta Phytotax. Geobot. **6**: 4 (1935) & in Mem. Coll. Sci., Kyoto Imp. Univ., Ser. B, **13**: (Compos. Jap. I) 150 (1937).

Subsect. *Laguranthera* non C. A. Mey. ex Endl.: Nakai in Bot. Mag. Tokyo **29**: 197 (1915) – Kitam. in Acta Phytotax. Geobot. **6**: 5 (1935) & in Mem. Coll. Sci., Kyoto Imp. Univ., Ser. B, **13**: (Compos. Jap. I) 151 (1937).

Saussurea wakasugiana Kadota, sp. nov. [Figs. 1, 2, 3A]

Differt a *Saussurea kudoana* foliis acutis leniter pinnatis basi profunde cordatis et acheniis brevioribus leviter brunneis; a *S. insulari* foliis anguste ovatis actuis crassioribus leniter pinnatis, pedunculis brevioribus et absentia bractearum squamatarum in pedunculis.

TYPE: JAPAN; Honshu, Fukui Pref., Ôi-gun, Ôi-chô, Ôshima Peninsula, the Shaka-ga-hama Beach, near the sea level, 27 Sept. 2003, Y. Kadota 031001 (TNS–holotype; TNS–isotypes).

A herbaceous perennial, 25–70 cm tall. Stem erect, striate and not winged, arachnoid, branched in the upper part; rhizome horizontal, with string-like roots. Basal leaves withering at anthesis. Lower cauline leaves coriaceous, ovate, 5–18 cm long, 3–15 cm wide, coarsely dentate to shallowly pinnate, if pinnate, 2–3-jugate, sparingly arachnoid on the abaxial side or subglabrous, deeply cordate to cordate or rarely broadly cuneate at base, acute at apex; petioles (2–) 5–25 cm long, sparingly arachnoid. Upper cauline leaves ovate to narrowly ovate, 1–4 cm long, 0.2–1.5 cm wide, serrate, similarly pubescent to the lower cauline leaves, shortly petioled to subsessile. Flowers in September, with 3–7 capitula, arranged in a compact corymb; peduncles 2–8 mm long, shortly winged, sparingly arachnoid. Involucres narrowly ovoido-cylindrical, 4–7 mm in diameter, ca. 1 cm long, arachnoid; phyllaries 9-seriate; outer 2 mm long, ovate, shortly caudate; inner oblong, 8 mm long, acute. Corollae pale violet, 10–12 mm long; lobes 3 mm long; throats 2–3 mm long; tubes 5–6 mm long, longer than the throats. Pappi 8 mm long, shorter than the corollae, grayish white. Achenes 4 mm long, glabrous, straw-colored.

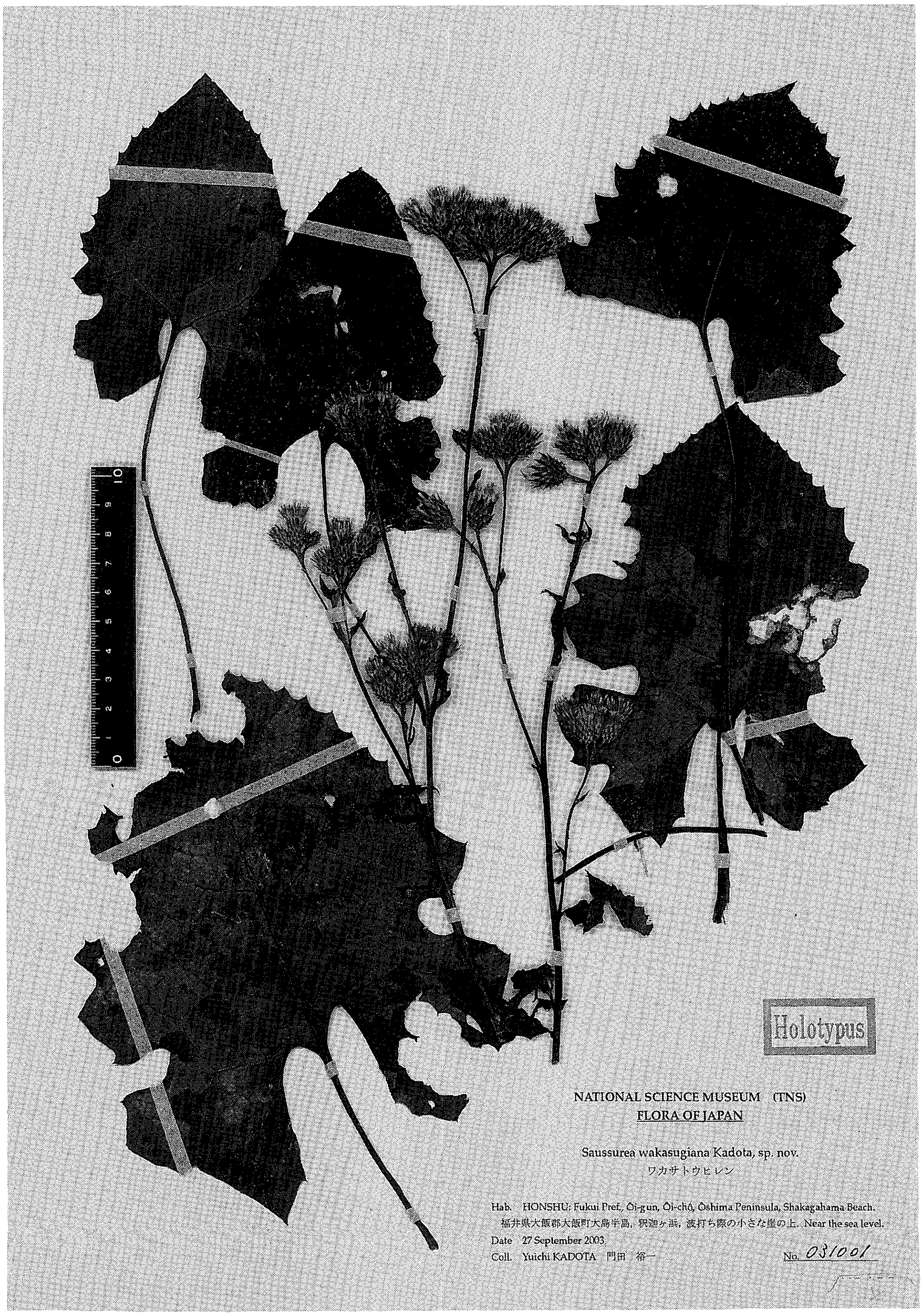
Chromosome number: 2n = 26.

Japanese name: Wakasa-tôhiren (nov.).

Distribution: Ôshima Peninsula, Fukui Pref., Japan (endemic).

Specimens examined: JAPAN; Honshu, Fukui Pref., Ôi-gun, Ôi-chô, Ôshima Peninsula, the Shaka-ga-hama Beach, cult. at Fukui Botanical Garden, 5 Oct. 2002, Y. Kadota s. n. (TNS).

Saussurea wakasugiana is morphologically similar to *S. kudoana* (including var. *uryuensis*) and *S. insularis*. *Saussurea kudoana* is distinguished from *S. wakasugi-*



NATIONAL SCIENCE MUSEUM (TNS)
FLORA OF JAPAN

Saussurea wakasugiana Kadota, sp. nov.
ワカサトウヒレン

Hab. HONSHU: Fukui Pref., Ôi-gun, Ôi-chô, Ôshima Peninsula, Shakagahama Beach.
福井県大飯郡大飯町大島半島，釈迦ヶ浜，波打ち際の小さな崖の上. Near the sea level.
Date 27 September 2003
Coll. Yuichi KADOTA 門田 裕一
No. 031001

Fig. 2. Type specimen of *Saussurea wakasugiana* Kadota (JAPAN: Honshu; Fukui Pref., Ôi-gun, Ôi-cho, the Shaka-ga-hama Beach, 27 Sept. 2003, Kadota 031001, holotype, TNS).

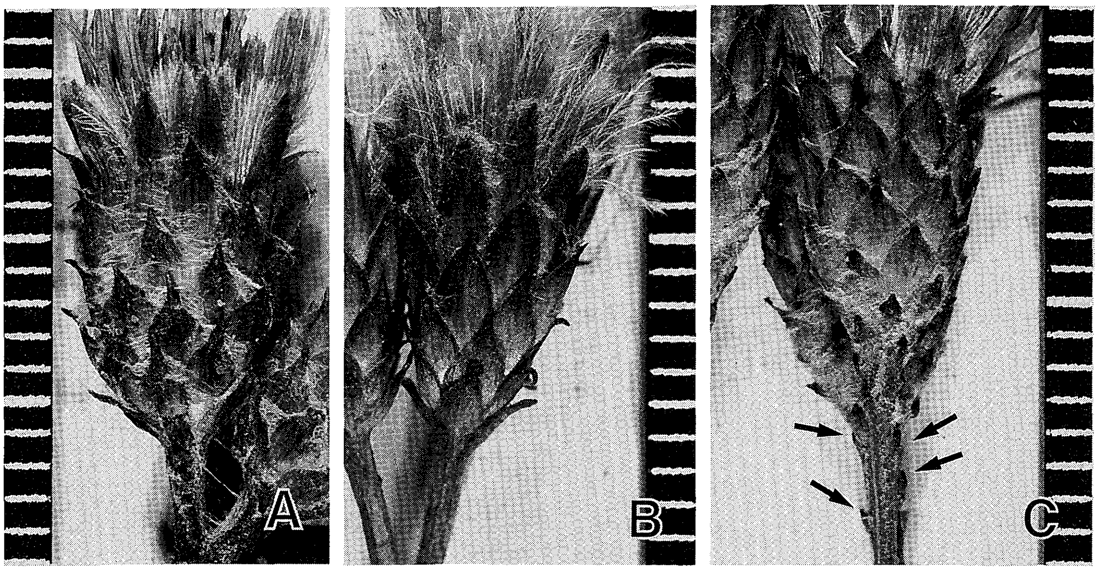


Fig. 3. Comparison among *Saussurea wakasugiana* and its related species in involucres. A. *S. wakasugiana* (holotype, TNS). B. *S. kudoana* Tatew. & Kitam. var. *kudoana* (JAPAN: Hokkaido; Hidaka-shicho, Samani-gun, Samani-cho, Mt. Apoidake, on serpentine soils, 9 Sept. 1986, Y. Kadota 13864, TNS). C. *S. insularis* Kitam. (JAPAN: Kyushu; Nagasaki Pref., Shimoagata-gun, Mizushima-cho, Is. Tushima, Mt. Shiratake, alt. 500 m, 1 Oct. 1968, H. Koyama 2888, TNS). Arrows indicate scaly bracts.

ana by having narrowly ovate and serrulate leaves with an acuminate apex and with roundish to subtruncate or shallowly cordate base and longer, dark brownish achenes. *Saussurea insularis* is discriminated from *S. wakasugiana* by having ovate, coarsely serrate leaves with an acuminate apex and minute scaly bracts on the peduncles.

Among the Japanese species of the genus *Saussurea* the two species, *S. acuminata* Turcz. and *S. fauriei* Franch., occur in maritime regions (Kadota unpublished data). *Saussurea acuminata* and *S. fauriei* are distributed in Hokkaido and Aomori and Hokkaido, northern Japan, respectively. Both species grow in tall herb stands near the seashore, however, their habitats are never covered by seawater in usual cases. As mentioned above *S. wakasugiana* grows on ultrabasic soils on the seashore. This habitat is regularly inundated with seawater even on slightly windy days. On the contrary *S. kudoana* (including var. *uryuensis*) and *S. insularis* are found on rocky slopes and in herb stands in the mountains. The habitat situation of *S. wakasugiana* is thus exceptional for the species of the genus *Saussurea* in Japan.

I wish to show my cordial thanks to Mr. T. Wakasugi, the Director of Fukui Botanical Garden, for his guidance to the Ôshima Peninsula, the type locality of *Saussurea wakasugiana*, and valuable information on *Saussurea* of Fukui Prefecture; to Dr. A. Matsumoto, Curator, Fukui Botanical Gaden, for his helpful assistence in the Ôshima Peninsula in 2003; to Prof. Dr. T. Nishikawa, Hokkaido University of Education, Asahikawa, for his counting of chromosomes of *S. wakasugiana*. My thanks also go to the Curators of the Herbaria (KYO and TNS) for

the permission to observe herbarium specimens preserved there.

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門田裕一：**キク科トウヒレン属の1新種，ワカサトウヒレン**

福井県若狭地方からトウヒレン属（キク科）の新種，ワカサトウヒレン *Saussurea wakasugiana* Kadota を記載した．ワカサトウヒレンの葉は革質で広卵形，先端は鈍形で，辺縁は浅く羽裂するか欠刻状の粗い鋸歯縁となり，葉脚は普通深い心形，総苞は狭筒形で，総苞片は9列，総苞外片は卵形で短く，長さ内片の約1/4，先端は短く尾状に尖る．形態的には，ワカサトウヒレンは北海道のヒダカトウヒレン *S. kudoana* Tatew. & Kitam.（ウリュウトウヒレン var. *uryuensis* Kadota を含む）と長崎県・対馬の白岳から報告されているシマトウヒレン *S. insularis* Kitam.に似ている．しかし，ヒダカトウヒレンは葉が狭卵形で辺縁は細かい鋸歯縁となり，先端は尾状に尖り，葉脚は円形～切形～浅い心形で，痩果は黒褐色で長さ約6 mmであり，シマトウヒレンは葉の質が薄く，先端は尾状に尖り，辺縁は細かい鋸歯縁となり，頭花の柄が明らかに長く，長さ1 mmほどの小型の苞葉を多数つける点で（Fig. 3C, 矢印），ワカサトウヒレンと異なっている．なお，ワカサトウヒレンの種形容語（種小名）は発見者である，若杉孝生氏に因んだものである．

ワカサトウヒレンは海岸沿いの小さな崖垂上に成立した草地や岩礫地に生育する（Fig. 1, A）．本種の分布域は福井県大島半島の一角に局限されているが，これはこの場所が超塩基性のカンラン岩の砂礫に被われていることと関係があると考えられる．また，この生育地は，暴風雨の折はいうに及ばず，多少とも風が強ければ波を被るようなところであり，日本産トウヒレン属としては他に例を見ない．北海道や青森県にはフォーリーアザミ *S. fauriei* Franch. やトナカイアザミ *S. acuminata* Turcz. が分布するが，これらの生育地は沿海地の草原であり，ワカサトウヒレンのそれとは異なる．因みに，形態的に似たヒダカトウヒレンとシマトウヒレンの生育地は山地稜線上の岩礫地あるいは草地である．